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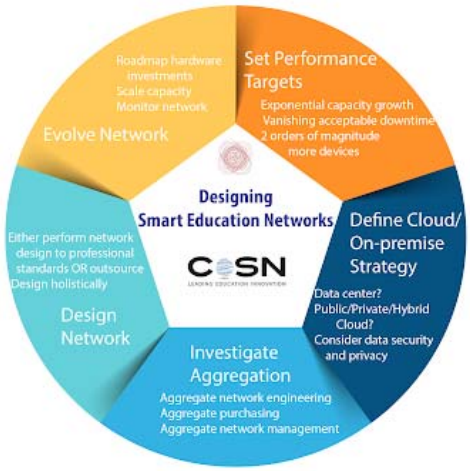
# Five Steps to Smart Networks

## Not just more. Different.

The one constant in an uncertain technology landscape is change. And for district leaders the pace of change is accelerating.

For many districts, the original SETDA capacity targets for 2014 of 0.1 Mbps/student, which have been endorsed by the Obama Administration and adopted by the FCC, still seem unattainable. The 2017 targets of 1Mbps/student seem outrageous and yet are still an order of magnitude less than the network capacity per user available in many homes.

Districts that rely on their network infrastructure for instruction report they can really afford no downtime. Zero. These districts are working towards "five nines" of network availability.




Most district networks were built to support one computer per staff person, with access primarily to enterprise services. These networks will soon (or may already) be expected to support a device for each student and staff. In BYOD environments, districts are beginning to see 3-5 devices per user - an increase of two orders of magnitude over the days when districts had, at best, computer labs plus computers for staff. In many districts, users are beginning to expect nearly unlimited robust access to the Internet, 24/7/365 access to digital resources, and many devices will still require secure access to enterprise services both within the building and via external networks.

Traditional school networks generally cannot simply be expanded to meet these needs. They need to be different and (re-)designed holistically. Traditional, occasional, incremental upgrades cannot support the systemic changes that are required to meet the demands of continually evolving education technology utilization and practice.

To meet the digital challenges of the next few years, districts both small and large must take a holistic approach towards designing their education networks (see The New Network) then systematically work towards implementing those designs according to district priorities and financial capacity. This design work is highly complex and involves numerous trade-offs that are often not obvious at first glance. Highly sophisticated districts with professional network architects and engineers are struggling with making these trade-offs and pioneering holistic designs. Districts with fewer resources are looking to professional 3d party network design vendors or state education and research network services or other consortia to ensure maximum performance and cost efficiency of their infrastructure.

Many elements of smart education network design are counterintuitive in an environment that still thinks of the growth of requirements on the network as linear. The steps below outline considerations that must be intentionally accounted for in the design of smart education networks to ensure that technology investments meet their potential, survive the lifetime of the investment, and do not need to be repeated prematurely due to a failure to recognize the impact of digital transformation on network infrastructure.

**Smart Network Design Steps**

- **Step 1: Set performance targets:** What network capacity will your district require in 5 years? How much downtime can your district afford annually, today and 5 years from now? How many devices are on your district network today, and how many will you support in five years? Although there are no crystal balls, the experience of mature 1:1 implementations and the aggregate experience of districts moving towards digital conversion suggest several rules of thumb for thinking about the growth of network performance requirements.

  The key lies in understanding first the realistic initial network usage which requires that stakeholders from across the organization, including the instructional, administrative, and technical areas work together to create a clear vision for what teaching and learning with technology will look like in the district. From this starting point, districts can use the experience of pioneers who are in the trenches of ongoing digital conversion to extrapolate their growing needs over the lifetime of their technology plans.

- **Step 2: Define cloud/on-premise service strategy:** What data requires high levels of security and where is that best guaranteed? What data needs to be accessed from personal devices via home, cellular, or community networks? How scalable and/or redundant does your digital environment need to be? These questions drive decisions regarding the hosting of data, software, and services in individual buildings, district cores, and public or private cloud environments. This in turn drives data flow through the school network and affects capacity and design of the WAN. With the current landscape of legislative intervention in issues of data privacy and security, this is no longer simply an issue of cost and quality of solutions for many districts.

- **Step 3: Investigate aggregation:** For most districts it is difficult to achieve the purchasing power for high capacity networks or the personnel to plan and manage them. There are several aggregation approaches that can give smaller districts the same opportunities as are being implemented by very large districts and states.

- **Step 4: Design network:** What standards will your network be designed to? Who will design and implement your network? Do you have professional network architecture, design and engineering expertise in-house or will you need to consider 3d party support or managed services? Does your team/provider have the expertise to design for affordable scalability, high capacity and reliability, anytime/anywhere access, and phased implementation?

- **Step 5: Evolve network:** Few districts have the resources to implement a high-performance network from scratch. Most districts are faced with evolving their existing networks towards their goals over time. This evolution has three elements: Hardware Roadmapping, Capacity Scaling, and Network Monitoring.